Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of the claims in the application:

Listing of Claims:

1. (Previously Presented) A radiosurgery x-ray system, comprising:

an x-ray source having an emission head at a distal end of an arm assembly extending from a base unit; and

a collision avoidance subsystem coupled to the arm assembly, the collision avoidance subsystem comprising means for preventing said head and arm assembly from effecting a collision with an object in one or more predetermined exclusion zones.

2. (Previously Presented) A system according to claim 1, wherein said collision avoidance subsystem interrupts motion of said head toward said at least one exclusion zone in response to an observation of the object extending through said exclusion zone by at least one of the collision avoidance subsystem and a user.

3. (Previously Presented) A system according to claim 1, wherein said collision avoidance subsystem slows down motion of said head toward said at least one exclusion zone in response to an observation of the object extending through said exclusion zone by at least one of the collision avoidance subsystem and a user.

4. (Cancelled)

5. (Previously Presented) A system, comprising:

an x-ray source having an emission head mounted at a distal end of an arm assembly to selectively emit an x-ray beam;

a collision avoidance subsystem coupled to the arm assembly to prevent the emission head and arm assembly from colliding with an object in one or more

predetermined exclusion zones, the collision avoidance subsystem comprising one or more optical emitter-receiver pairs comprising:

an optical emitter including a light source for generating a substantially planar light beam between at least one predetermined exclusion zones and the x-ray source; and

an optical receiver for receiving back-scattered light from an object extending through the substantially planar light beam.

6. (Previously Presented) A system according to claim 5, wherein the substantially planar light beam establishes a barrier that defines at least in part the one or more predetermined exclusion zones.

7. (Original) A system according to claim 6, wherein said barrier is a movable barrier.

8. (Previously Presented) A system according to claim 5, wherein the collision avoidance subsystem is responsive to at least one of an observation of an object extending through said light beam and a user action to be taken in response to the observation of the object extending through said light beam, to perform at least one of the following operations: interrupt motion of said head toward said at least one exclusion zone and slow down motion of said head toward said at least one exclusion zone.

9. (Previously Presented) A system according to claim 5 wherein said one or more optical emitter-receiver pairs are positioned with respect to a base unit coupled to the arm assembly.

10. (Previously Presented) A system according to claim 5 wherein said planar light beam is fan-shaped and extends from said one or more optical emitter-receiver pairs.

11. (Previously Presented) A system according to claim 5 wherein said one or more optical emitter-receiver pairs comprise at least one of a laser and an LED.

12. (Previously Presented) A system according to claim 5 wherein said one or more optical emitter-receiver pairs are positioned with respect to said head, and wherein the at least one predetermined exclusion zones travels with x-ray source.

13. (Previously Presented) A system, comprising:

an x-ray source having an emission head mounted at a distal end of an arm assembly to selectively emit an x-ray beam; and

a collision avoidance subsystem coupled to the arm assembly to prevent the emission head and arm assembly from colliding with an object in one or more predetermined exclusion zones, wherein said collision avoidance subsystem comprises:

an array of acoustic transducers coupled to said x-ray source, wherein each of said transducers transmits a succession of acoustic pulses along a transmission axis extending from said x-ray source, detects acoustic energy back-scattered along said transmission axis from an object disposed along said transmission axis, and determines from said received back-scattered acoustic energy a distance between said x-ray source and said object, and wherein the transmission axis of each acoustic transducer is mutually aligned whereby a cross-section of adjacent pairs of said pulses transverse to said transmission axis is contiguous at a predetermined distance from said x-ray source.

14. (Original) A system according to claim 13 wherein said array of acoustic transducers are attached to said emission head of said x-ray source.

15. (Original) A system according to claim 13 wherein said array of acoustic transducers form sense cones.

16. (Previously Presented) A system comprising:

an x-ray source having an emission head mounted at a distal end of an arm assembly to selectively emit an x-ray beam;

a collision avoidance subsystem coupled to the arm assembly to prevent the emission head and arm assembly from colliding with an object in one or more predetermined exclusion zones, wherein said collision avoidance subsystem comprises:

a sensor disposed on at least one of said arm assembly and said emission head, said sensor to generate an alarm signal upon impact of said sensor with an object during motion of the at least one of said arm assembly and said emission head; and wherein the collision avoidance subsystem interrupts motion of the at least one of said arm assembly and said emission head in response to said alarm signal.

17. (Currently Amended) A system in accordance with claim 16, wherein said sensor comprises at least one of [[:]] a tactile sensor~~,~~ ~~;~~ an infrared sensor~~,~~ ~~;~~ and a capacitance sensor.

18. (Original) A system according to claim 16 wherein said sensor is a tactile sensor, and comprises a fluid filled bladder and a pressure transducer coupled to the bladder for generating said alarm signal when fluid pressure in said bladder exceeds a predetermined threshold.

19. (Previously Presented) A radiosurgery system according to claim 5, wherein two or more optical emitter-receiver pairs of the one or more optical emitter-receiver pairs form a linear array of light sources.

20. (Currently Amended) A radiosurgery x-ray system, comprising:

an x-ray source having an emission head at a distal end of an arm assembly extending from a base unit; and

a collision avoidance subsystem comprising means for preventing said head ~~form~~ from entering one or more predetermined exclusion zones.

21. (Previously Presented) A system according to claim 20, wherein said collision avoidance subsystem prevents said head from entering said at least one

exclusion zone in response to an observation of the said x-ray head extending within a predetermined distance from the at least one of said exclusion zones.

22-30. (Cancelled)

31. (Previously Presented) A system according to claim 13, further comprising a photodetector for detecting light from said planar light beam that is back-scattered from said object.

32. (Previously Presented) A system comprising:

an x-ray source having an emission head at a distal end of the arm assembly extending from the base unit; and

a collision avoidance subsystem coupled to the arm assembly, wherein said collision avoidance subsystem comprises a laser rangefinder for detecting a presence and location of said object in said one or more exclusion zones.

33. (Original) A system according to claim 32, wherein said photodetector comprises a photomultiplier tube.

34. (Cancelled)

35. (Previously Presented) A system according to claim 5, wherein the arm assembly is a robotic arm of an image guided robotic system.

36. (Previously Presented) A system according to claim 5, wherein the one or more optical emitter-receiver pairs are lined up to form a line source effective to establish the substantially planar light beam.

37. (Previously Presented) A system according to claim 5, wherein the one or more optical emitter-receiver pairs are lined up to form three line sources effective to

establish a substantially rectangular exclusion zone comprising three distinct substantially planar light beams.

38. (Previously Presented) A system according to claim 5, wherein the one or more optical emitter-receiver pairs are mounted to a wall of a treatment room.

39. (Previously Presented) A system according to claim 5, wherein the collision avoidance subsystem comprises a linear array of light sources effective to establish the substantially planar light beam.

40. (Previously Presented) A system according to claim 5, wherein the collision avoidance subsystem comprises a single light sources effective to establish the substantially planar light beam by repetitively sweeping along a plane of the substantially planar light beam.

41. (Previously Presented) A system according to claim 5, further comprising:

a photodetector coupled to the one or more optical emitter-receiver pairs to detect an intensity of the back-scattered light; and

a data acquisition system coupled to the one or more optical emitter-receiver pairs to determine a distance to the object.

42. (Previously Presented) A system according to claim 13, wherein the arm assembly is a robotic arm of an image guided robotic system.

43. (Previously Presented) A system according to claim 13, wherein the array of acoustic transducers are ultrasonic transducers.

44. (Previously Presented) A system according to claim 13, wherein the array of acoustic transducers determines the distance between the x-ray source to the object within a range of approximately 6 to 80 inches from the object.

45. (Previously Presented) A system according to claim 13, wherein the collision avoidance subsystem interrupts motion of said head toward said at least one exclusion zone in response to an observation of the object extending through said exclusion zone by at least one of the collision avoidance subsystem and a user.

46. (Previously Presented) A system according to claim 16, wherein the arm assembly is a robotic arm of an image guided robotic system.

47. (Previously Presented) A system according to claim 32, wherein the arm assembly is a robotic arm of an image guided robotic system.

48. (Previously Presented) A system according to claim 32, wherein said laser rangefinder comprises:

a transmitter for generating laser light and transmitting the laser light toward at least one of said exclusion zones;

a receiver for receiving laser light that is generated by said transmitter and that is back-scattered from said object;

a photodetector for detecting the intensity of the light received by the receiver; and

a data acquisition system effective to compute a distance to said object by measuring a time required for said laser light to reach said object and return to said transmitter.

49. (Currently Amended) A system according to claim 32, wherein said laser rangefinder comprises:

means for generating laser light and transmitting the laser light toward at least one of said exclusion zones;

means for receiving laser light that is generated by said transmitter and that is back-scattered ~~form~~ from said object;

means for detecting the intensity of the light received by the receiver; and

means for measuring the time required for said laser light to reach said object and return to said transmitter, thereby determining the distance to said object.

50. (Previously Presented) A method comprising:

defining one or more predetermined exclusion zones of a radiosurgery system, the radiosurgery system comprising an x-ray source having an emission head at a distal end of an articulated arm assembly;

detecting a presence and location of an object in the one or more predetermined exclusion zones; and

preventing the emission head from entering one or more predetermined exclusion zones.

51. (Previously Presented) The method of claim 50, further comprising preventing the emission head and arm assembly from effecting a collision with the object in one or more predetermined exclusion zones.

52. (Previously Presented) The method of claim 50, further comprising interrupting motion of the emission head toward the one or more predetermined exclusion zones.

53. (Previously Presented) The method of claim 50, further comprising halting a motion of the emission head toward the one or more predetermined exclusion zones.

54. (Previously Presented) The method of claim 50, further comprising slowing down a motion of the emission head toward the one or more predetermined exclusion zones.

55. (Previously Presented) The method of claim 50, wherein preventing the emission head from entering one or more predetermined exclusion zones comprises manually preventing the emission head from entering one or more predetermined exclusion zones in response to observation of the object extending through the one or more predetermined exclusion zones.

56. (Previously Presented) The method of claim 50, wherein preventing the emission head from entering one or more predetermined exclusion zones comprises automatically preventing the emission head from entering one or more predetermined exclusion zones in response to observation of an object extending through said exclusion zone by the collision avoidance subsystem.

57. (Previously Presented) The method of claim 50, wherein preventing the emission head from entering one or more predetermined exclusion zones further comprises establishing a substantially planar light beam between at least one of said exclusion zones and said emission head using one or more light sources.

58. (Previously Presented) The method of claim 57, further comprising interrupting motion of said head toward said at least one exclusion zone in response to at least one of an observation of an object extending through said light beam and a user action to be taken in response to the observation of the object extending through said light beam.

59. (Previously Presented) The method of claim 57, further comprising slowing down a motion of said head toward said at least one exclusion zone in response to at least one of an observation of an object extending through said light beam and a user action to be taken in response to the observation of the object extending through said light beam.

60. (Previously Presented) The method of claim 50, wherein preventing the emission head from entering one or more predetermined exclusion zones further comprises repetitively sweeping a linear light beam from a light source along to establish a barrier that defines at least in part said exclusion zone.

61. (Previously Presented) The method of claim 50, wherein preventing the emission head from entering one or more predetermined exclusion zones further comprises:

transmitting a succession of acoustic pulses along a transmission axis extending from said x-ray source; and

determining a distance between said x-ray source and said object.

62. (Previously Presented) The method of claim 61, wherein determining the distance comprises detecting acoustic energy back-scattered along said transmission axis from an object disposed along said transmission axis, and wherein the transmission axis of each acoustic transducer are mutually aligned whereby a cross-section of adjacent pairs of said pulses transverse to said transmission axis is contiguous at a predetermined distance from said x-ray source.

63. (Previously Presented) The method of claim 61, further comprising interrupting motion of said head toward at least one of said exclusion zones in response to said determined distance being at or less than a predetermined value.

64. (Previously Presented) The method of claim 61, wherein determining the distance between said x-ray source and said object further comprises determining the distance within a range of approximately 6 to 80 inches from the object.

65. (Previously Presented) The method of claim 50, wherein preventing the emission head from entering one or more predetermined exclusion zones further comprises:

generating an alarm signal upon impact of an object with a sensor during motion of the at least one of said arm assembly and emission head; and

interrupting motion of the at least one of said arm assembly and emission head in response to the alarm signal.

66. (Previously Presented) The method of claim 65, wherein said sensor is a tactile sensor including a fluid filled bladder and a pressure transducer coupled to the bladder, and wherein generating the alarm signal comprises generating said alarm signal when fluid pressure in said bladder exceeds a predetermined threshold.

67. (Previously Presented) The method of claim 50, wherein preventing the emission head from entering one or more predetermined exclusion zones further comprises detecting the presence and location of said object in said one or more exclusion zones using a laser rangefinder.

68. (Previously Presented) The method of claim 67, wherein detecting the presence and location of said object further comprises:

generating laser light;

transmitting the laser light toward at least one of said exclusion zones;

receiving back-scattered laser light from the object;

detecting an intensity of the back-scattered laser light from the object;

determining a time required for said laser light to reach and return from the object; and

determining a distance to said object using the time.

69. (Currently Amended) The method of claim 67, further comprising determining a velocity of the object, wherein determining the velocity comprises:

generating laser light;

transmitting the laser light toward at least one of said exclusion zones;

receiving back-scattered laser light from the object;

detecting a Doppler shift using a wavelength of the back-scattered laser light from the object; and

determining the velocity using the Doppler shift.

70. (Currently Amended) A radiosurgery x-ray system, comprising:

a robot positioning system having an arm assembly extending from a base unit;

an x-ray source having an emission head at a distal end of the arm assembly to selectively emit an x-ray beam; and

a collision avoidance subsystem coupled to the robot positioning system, wherein the collision avoidance subsystem is configured to prevent said head ~~form~~ from entering one or more predetermined exclusion zones.

71. (Previously Presented) The radiosurgery x-ray system of claim 70, wherein the collision avoidance subsystem is configured to prevent the emission head and arm assembly from effecting a collision with an object in one or more predetermined exclusion zones.

72. (Previously Presented) The radiosurgery x-ray system of claim 70, wherein the collision avoidance subsystem comprises one or more light sources for establishing a substantially planar light beam between at least one of said exclusion zones and said emission head.

73. (Previously Presented) The radiosurgery x-ray system of claim 70, wherein the collision avoidance subsystem comprises an array of acoustic transducers coupled to said x-ray source, wherein each of said transducers transmits a succession of acoustic pulses along a transmission axis extending from said x-ray source for determining a distance between said x-ray source and said object.

74. (Previously Presented) The radiosurgery x-ray system of claim 70, wherein the collision avoidance subsystem comprises a sensor disposed on at least one of said arm assembly and said emission head for generating an alarm signal upon impact of said sensor with an object during motion of the at least one of said arm assembly and emission head.

75. (Previously Presented) The radiosurgery x-ray system of claim 70, wherein the collision avoidance subsystem comprises a laser range finder for detecting a presence and location of said object in said one or more exclusion zones.